ABSTRACT

Efficient Rate Allocation for Multi-resolution Coding of Data

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There are disclosed three fast rate control methods that can efficiently reduce or remove the computation and memory usage redundancy over conventional PCRD methods. The first method, called successive bit-plane rate allocation (SBRA), assigns the maximum allowable bit-rate for each bit-plane of each code-block by using the currently available rate-distortion information only. The second method is called priority scanning rate allocation (PSRA). This first predicts the order of magnitude of each truncation point's rate-distortion slope and then encodes the truncation points based on the order (priority) information. The third method uses PSRA to obtain a significantly smaller amount of data than PCRD for optimal truncation and is called priority scanning with optimal truncation (PSOT). SBRA provides the highest computational complexity and memory usage reduction, and the lowest coding/transmission delay. The computational complexity reduction can be up to about 90% of the entropy coding process. However this method gives the lowest PSNR performance of the three. PSRA provides higher PSNR performance than SBRA with the penalty of lower memory usage reduction and higher delay. PSOT provides the best (optimal) quality while it is the least efficient method in term of computational complexity, memory usage and the coding/transmission delay. The three methods provide different degree of computation complexity and memory reduction, coding/transmission delay and PSNR performance. The most suitable rate control method can be chosen based on application requirements.